STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Safety control engineering in electrical grid and in power plants	**1010311361010316135**

Field of study	Profile of study (general academic, practical)	Year /Semester
Power Engineering	**(brak)**	**3 / 6**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **2** Classes: **-** Laboratory: **2** Project/seminars: **-**	**4**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge within the scope of electrical engineering, electrical power engineering and electrical power systems and networks
2	**Skills**	Ability to effective self-studying in the domain connected with chosen course of studying, ability to use computer simulation to evaluate performance of elements of power system
3	**Social competencies**	Has a consciousness of necessity to widen competences and willingness to work in a team

Assumptions and objectives of the course:

To acquaint with basic tasks and technical solutions of electric power protection (EAZ) in electric power systems

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has the basic knowledge within the scope of renewable energy sources, like wind power, solar power, biomas and geothermal power. Know and understand phenomena, processes and devices allowing on conversion of energy renewable sources into electric energy and heat - [K_W09+++]

2. Is familiar with current state and modern trends of power engineering development - [K_W20++]

Skills:

1. Is able to collect information from literature, data bases, and other sources, is able to integrate and interpret gained information and also to conclude and to formulate and validate opinions - [K_U01++]

2. Is able to work solely and in the team , can estimate time necessary to complete ordered task, is able to elaborate and realize schedule of works allowing to keep to the deadlines - [K_U02++]

3. Is able to use properly chosen methods and devices allowing to weasure basic quantities characterizing electric power elements and systems - [K_U10++]

Social competencies:

1. Has a consciousness of validity and understand non-technical aspects and effects of activity of electric power engineer such as influence on environment and responsibility connected with this activity - [K_K02++]

2. Has a consciousness about responsibility for his own work and ability to accept the rules of work in the team and to be responsible for collective realized tasks - [K_K04++]

Assessment methods of study outcomes

Lecture

- evaluation of the knowledge and competitions on written exam (problem character)
- permanent evaluation on every class rewarding for activity and quality of perception

Laboratory

- pre-classes verifying tests

rewarding the knowledge necessary for realization of problems connected with laboratory tasks

- permanent evaluation on every class rewarding increase of competence to use learned investigation methods

Course description

Tasks and functions of elements of electric power engineering protection (EAZ), digital technology, Protection systems for generators,transformers and lines. Automatics SPZ, SCO, SZR. Modern solutions of EAZ systems used in power system and basics of selection of settings

Laboratory classes related to investigation of basic protections (relays) and of it?s autonomic sets and of models of the elements of electric power systems

Basic bibliography:

1. Winkler W., Wiszniewski A.: Automatyka zabezpieczeniowa w systemach elektroenergetycznych, Wyd. I - WNT Warszawa 1999, Wyd. II - WNT Warszawa 2004.

2. Szafran J., Wiszniewski A.: Algorytmy pomiarowe i decyzyjne cyfrowej automatyki elektroenergetycznej, WNT Warszawa 2001.

3. Hoppel W., Lorenc J.: Zabezpieczenia i automatyka elektroenergetyczna. Materiały pomocnicze do laboratorium. Skrypt PP nr 1216.

Additional bibliography:

1. Musierowicz K., Staszak B.: Technologie informatyczne w elektroenergetyce. Wyd.PP 2010.

2. Lorenc J.: Admitancyjne zabezpieczenie ziemnozwarciowe. Wyd. PP 2007.

3. Wiszniewski A.: Przekładniki w elektroenergetyce. WNT Warszawa 1992.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	30
2. Tutorials related to lectures	4
3. Preparation to exam	20
4. Participation in exam	4
5. Participation in laboratory classes	30
6. Preparation of reports	6

Student’s workload

Source of workload	hours	ECTS
Total workload	94	4
Contact hours	68	3
Practical activities	30	1